IN THE CLAIMS:

1. (Previously Presented) A gas sensor comprising a cavity for containing a gas; means for generating radiation which is transmitted through the cavity and including one or more wavelengths which is absorbed in use by a gas to be detected; and a detector for detecting radiation which has passed through the cavity, the detector having a surface area which is visible to the interior of the cavity, wherein the radiation generating means and/or detector(s) is mounted on a printed circuit board (PCB) and is surrounded by resilient protection comprising a resilient member having one or more apertures through which the radiation means and/or respective detector(s) extend; and the resilient member, the PCB and the components mounted thereon are located in an electronics housing having an upper wall, the upper surface of which defines a wall of the cavity, the resilient member extending from the PCB to the upper wall of the electronics housing such that free volume therewithin is reduced.

2. (Cancelled)

3. (Previously Presented) A sensor according to claim 1, wherein the radiation generating means and/or respective detector(s) extends in a close fitting relationship through the aperture(s).

4. (Cancelled)

5. (Previously Presented) A sensor according to claim 1, wherein the resilient member and electronics housing have complementary keying features which interengage.

6. (Previously Presented) A gas sensor according to claim 1, wherein the cavity comprises a first end wall adjacent to which at least one of the means for generating radiation and the detector is positioned, a second end wall which opposes the first end wall, and a side

wall; the first and second end walls defining the height of the cavity between them and the width of the cavity being defined as a maximum dimension of the cavity orthogonal to its height, wherein the ratio of the height to the width is greater than or equal to 0.1 and less than 0.7.

7. (Previously Presented) A gas sensor according to claim 1, wherein the entire visible surface area of the detector is illuminated with substantially unfocussed radiation.

8. (Previously Presented) A gas sensor according to claim 1, wherein increasing the visible surface area of the detector relative to the surface area of the cavity walls increases the signal to noise ratio detected by the detector.

9. (Previously Presented) A sensor according to claim 1, wherein the radiation generating means generates infra-red radiation.

10. (Previously Presented) A sensor according to 1, wherein the infra-red radiation generating means comprises a heating element to heat gas within the cavity so as to cause the gas to generate infra-red radiation.

11. (Previously Presented) A sensor according to claim 1, further comprising one or more additional radiation detectors, each detector being adapted to sense radiation centered on a respective, different wavelength.

12. (Previously Presented) A sensor according to claim 1, wherein the cavity wall defines a window allowing radiation to pass therethrough to the or a respective detector.

13. (Previously Presented) A sensor according to claim 1, wherein a majority, preferably more than 90% of the cavity walls have a reflectivity to radiation exceeding 95%.

14. (Previously Presented) A sensor according to claim 1, wherein at least a portion of the cavity walls are provided with a reflective coating.

15. (Previously Presented) A sensor according to claim 14, wherein the reflective coating comprises gold plating.

16. (Previously Presented) A sensor according to claim 1, wherein the cavity walls are covered by a radiation transparent protective coating.

17. (Previously Presented) A sensor according to claim 1, wherein the cavity is tubular, for example cylindrical, and has substantially planar end walls.

18. (Currently Amended) A sensor according to claim 1, where the means for generating radiation, and detector are located within an outer housing having at least one aperture to allow gas to enter.

19. (Previously Presented) A sensor according to claim 18, further comprising a flame arrestor within the outer housing.

20. (Previously Presented) A sensor according to claim 19, wherein the flame arrestor is secured to an outer surface of a housing having at least one aperture, the housing defining a wall of the cavity, by a raised lip which overlaps the flame arrestor, whereby when the cavity housing is assembled in the outer housing, the raised lip defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housings.

21. (Cancelled)

22. (Currently Amended) A gas sensor comprising a cavity for containing a gas; means for generating radiation which is transmitted through the cavity and including one or more wavelengths which is absorbed in use by a gas to be detected; and a detector for

detecting radiation which has passed through the cavity, the detector having a surface area which is visible to the interior of the cavity, the walls of the cavity being sufficiently reflective to the radiation that the cavity is substantially uniformly illuminated with the radiation, wherein the cavity is tubular, for example cylindrical, and has substantially planar end walls, adjacent to at least one of which, at least one of the means for generating radiation and the detector is positioned and wherein the ratio of the height to the width of the cavity is greater than or equal to 0.1 and less than or equal to 0.7.

23. (Currently Amended) A sensor according to claim 22, wherein the height to width ratio is greater than or equal to 0.2 and less than or equal to 0.7.

24. (Currently Amended) A sensor according to claim 23, wherein the height to width ratio is greater than or equal to 0.4 and less than or equal to 0.7.

25. (Currently Amended) A sensor according to claim 24, wherein the height to width ratio is greater than or equal to 0.5 and less than or equal to 0.7.

26. (Previously Presented) A sensor according to claim 22, wherein the visible surface of the detector is illuminated with substantially unfocussed radiation.

27. (Previously Presented) A gas sensor according to claim 22, wherein the entire visible surface area of the detector is illuminated with substantially unfocussed radiation.

28. (Previously Presented) A gas sensor according to claim 22, wherein increasing the visible surface area of the detector relative to the surface area of the cavity walls increases the signal to noise ratio detected by the detector.

29. (Previously Presented) A sensor according to claim 22, wherein the radiation generating means and/or detector(s) is mounted on a printed circuit board and is surrounded by resilient protection.

30. (Previously Presented) A sensor according to claim 29, wherein the resilient protection comprises a resilient member having one or more apertures through which the radiation generating means and/or respective detector(s) extends.

31. (Previously Presented) A sensor according to claim 30, wherein the radiation generating means and/or respective detector(s) extends in a close fitting relationship through the aperture(s).

32. (Previously Presented) A sensor according to claim 29, wherein the PCB and the components mounted thereon are located in an electronics housing having an upper wall, the upper surface of which defines a wall of the cavity.

33. (Previously Presented) A sensor according to claim 30, wherein the resilient member and electronics housing have complementary keying features which interengage.

34. (Previously Presented) A sensor according to claim 22, wherein the radiation generating means generates infra-red radiation.

35. (Previously Presented) A sensor according to claim 34, wherein the infra-red radiation generating means comprises a heating element to heat gas within the cavity so as to cause the gas to generate infra-red radiation.

36. (Previously Presented) A sensor according to claim 22, further comprising one or more additional radiation detectors, each detector being adapted to sense radiation centered on a respective, different wavelength.

37. (Previously Presented) A sensor according to claim 22, wherein the cavity wall defines a window allowing radiation to pass therethrough to the or a respective detector.

38. (Previously Presented) A sensor according to claim 22, wherein a majority, preferably more than 90% of the cavity walls have a reflectivity to radiation exceeding 95%.

39. (Previously Presented) A sensor according to any of claim 22, wherein at least a portion of the cavity walls are provided with a reflective coating.

40. (Previously Presented) A sensor according to claim 39, wherein the reflective coating comprises gold plating.

41. (Previously Presented) A sensor according to claim 22, wherein the cavity walls are covered by a radiation transparent protective coating.

42. (Previously Presented) A sensor, according to claim 22, wherein the cavity, means for generating radiation, and detector are located within an outer housing having at least one aperture to allow gas to enter.

43. (Previously Presented) A sensor according to claim 42, further comprising a flame arrestor within the outer housing.

44. (Previously Presented) A sensor according to claim 43, wherein the flame arrestor is secured to an outer surface of a housing having at least one aperture, the housing defining a wall of the cavity, by a raised lip which overlaps the flame arrestor whereby, when the cavity housing is assembled in the outer housing, the raised lip defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housings.

45. (Cancelled)

46. (Previously Presented) A method of constructing a gas sensor, the method comprising:

(a) inserting a tubular, optical housing, closed by a wall at one end except for at least one gas access aperture, into a tubular outer housing closed at its end adjacent the closed end of the optical housing, except for at least one gas access opening;

(b1) fitting a resilient member over a radiation source and detector on a printed circuit board (PCB), the resilient member having one or more apertures through which the radiation means and/or respective detector(s) extend;

(b2) inserting the so-assembled resilient member, radiation source detector and printed circuit board into a tubular electronics housing, the electronics housing having an end wall closed at one end except for one or more apertures to allow access to the source and detector, the resilient member extending from the PCB to the upper wall of the electronics housing such that free volume therewithin is reduced;

(c) inserting the electronics housing into the outer housing so that it mates with the optical housing and defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use, the end wall of the electronics housing forming a wall of the cavity; and

(d) securing the assembled housings together.

47. (Previously Presented) A method according to claim 46, wherein step (d) comprises applying potting compound to the assembled housings.

48. (Previously Presented) A method of constructing a gas sensor according to claim 22, the method comprising:

(a) inserting a tubular, optical housing, closed by a wall at one end except for at least one gas access aperture, into a tubular outer housing closed at its end adjacent the closed end of the optical housing, except for at least one gas access opening;

(b) inserting a radiation source and detector on a printed circuit board into a tubular electronics housing, the electronics housing having an end wall closed at one end except for one or more apertures to allow access to the source and detector;

(c) inserting the electronics housing into the outer housing so that it mates with the optical housing and defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use; and, (d) securing the assembled housings together.

49. (Previously Presented) A method according to claim 48, wherein step (d) comprises applying potting compound to the assembled housings.

50. (Previously Presented) A method according to claim 46 for manufacturing a sensor according to claim 1.

51. (Cancelled)